

# The UNMC Pulmonary Embolism Response Team (PERT)

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# Disclosures

None



# Goals

- 1) Review the burden of pulmonary embolism (PE)
- 2) Discuss methods for risk stratification
- 3) Describe different approaches to management of PE
- 4) Highlight the role of the Pulmonary Embolism Response Team (PERT)
- 5) Review a subset of UNMC PE Cases



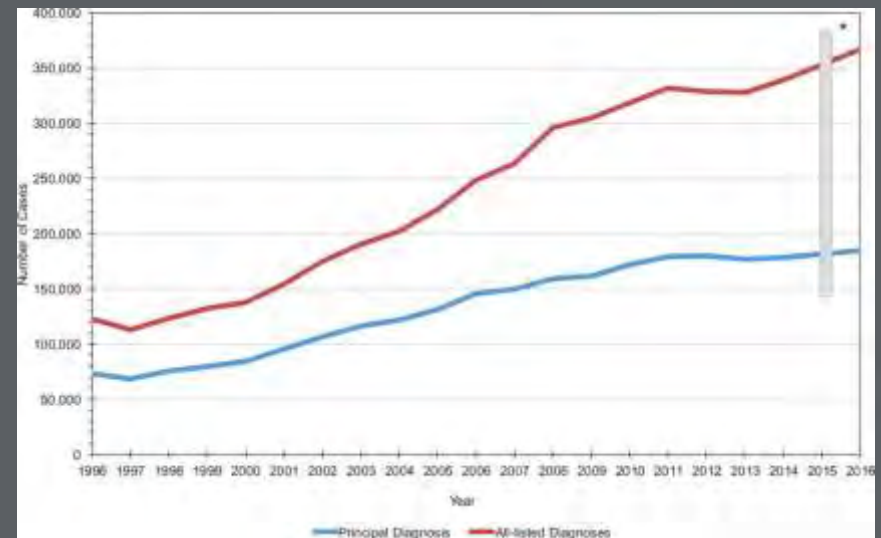
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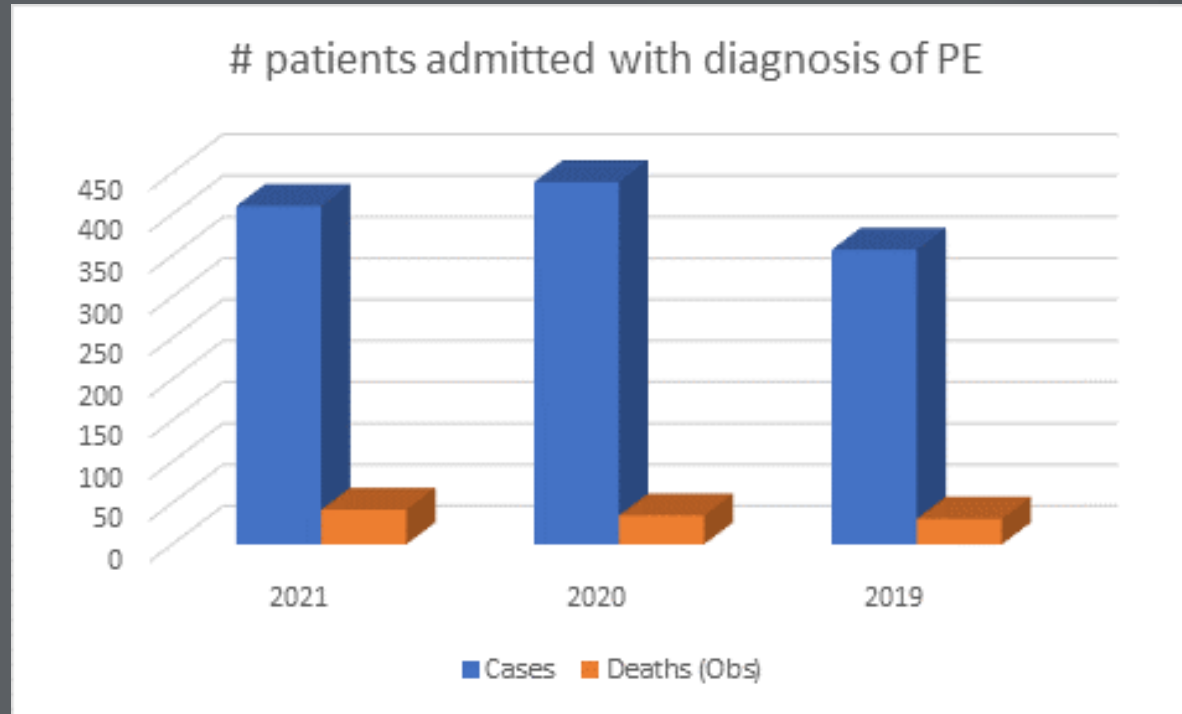


# Pulmonary Embolisms

- Admissions for PE increased from 23 per 100,000 in 1993 to 65 per 100,000 in 2012
  - ~375,000 cases annually
- Incidence continues to increase
- 30 day mortality rate
  - 1999 = 12.3%
  - 2010 = 9.1%
- 6 month mortality rate
  - 1999: 23%
  - 2010 = 19.6%
- Estimated healthcare cost
  - \$7-10 billion annually



# PE Treatment at UNMC



- Average of 402 patients a year admitted to UNMC with PE
- 30-day mortality: average of 8.9% per year



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# PE Risk Stratification

**Table 7** Original and simplified Pulmonary Embolism Severity Index

Parameter	Original version <sup>226</sup>	Simplified version <sup>229</sup>
Age	Age in years	1 point (if age >80 years)
Male sex	+10 points	–
Cancer	+30 points	1 point
Chronic heart failure	+10 points	–
Chronic pulmonary disease	+10 points	1 point

**Risk strata<sup>a</sup>**

<b>Class I: ≤65 points</b> very low 30 day mortality risk (0–1.6%)	<b>0 points = 30 day mortality risk 1.0%</b> (95% CI 0.0–2.1%)
<b>Class II: 66–85 points</b> low mortality risk (1.7–3.5%)	
<b>Class III: 86–105</b>	<b>≥1 point(s) = 30</b>

**Table 8** Classification of pulmonary embolism severity and the risk of early (in-hospital or 30 day) death

Pulse rate ≥
b.p.m.
Systolic BP
mmHg
Respiratory
>30 breath
min
Temperatu
<36°C
Altered me
status
Arterial ox;
globin satur
<90%

Early mortality risk	Indicators of risk			
	Haemodynamic instability <sup>a</sup>	Clinical parameters of PE severity and/or comorbidity: PESI class III–V or sPESI ≥1	RV dysfunction on TTE or CTPA <sup>b</sup>	Elevated cardiac troponin levels <sup>c</sup>
High	+	(+) <sup>d</sup>	+	(+)
Intermediate	Intermediate–high	–	+ <sup>e</sup>	+
	Intermediate–low	–	+ <sup>e</sup>	One (or none) positive
Low	–	–	–	Assesment optional; if assessed, negative



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# PE Treatment

	Risk of Bleeding	Rate of Thrombus Clearance	ICU stay	Length of Stay post-op
Systemic Heparin	Low	Low	No	N/A
Catheter Directed Thrombolysis (CDT)	Moderate (17 of 150 pts w/ bleeding in Seattle II study, 11%)	Moderate	Yes (~2 days)	1-2
Systemic TPA	High	Rapid	Yes (~ 1 day)	1-2
Mechanical aspiration	Low	Rapid	No	1-2

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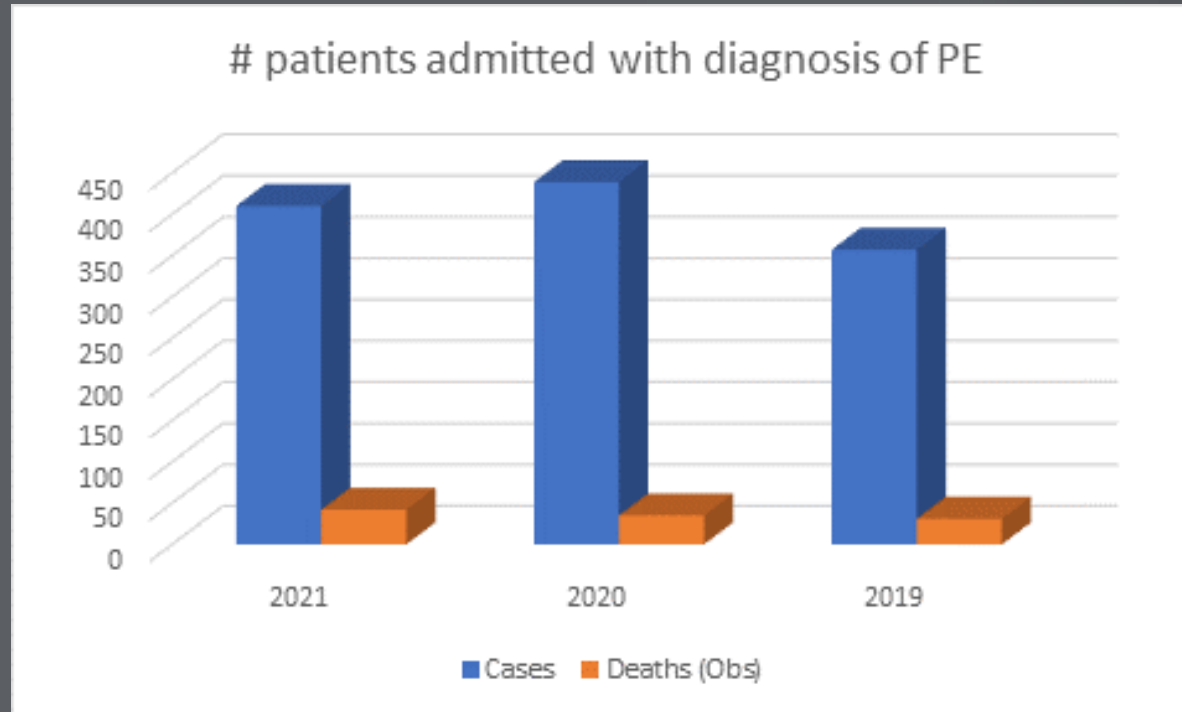


# PE Treatment at UNMC

- The issue:
  - Lack of who standardization regarding the who/when/and how to treat PE's as a system
- The response:
  - Multidisciplinary Pulmonary Embolism Response Team (PERT)
    - Formally started Feb 2022
    - Continuously working to improve delivery of care
- UNMC PE Response Team:
  - Multidisciplinary approach
    - CCM/Pulmonary Medicine: Dr. Boer, Dr. El-Kersh
    - Vascular Surgery: Dr. Cook
    - Interventional Radiology: Dr. McBride, Dr. Yu
    - Interventional Cardiology: Dr. Deffenbacher
    - Cardiac Surgery/ECMO
    - Critical Care Anesthesia
    - Cardiology



# PE Treatment at UNMC

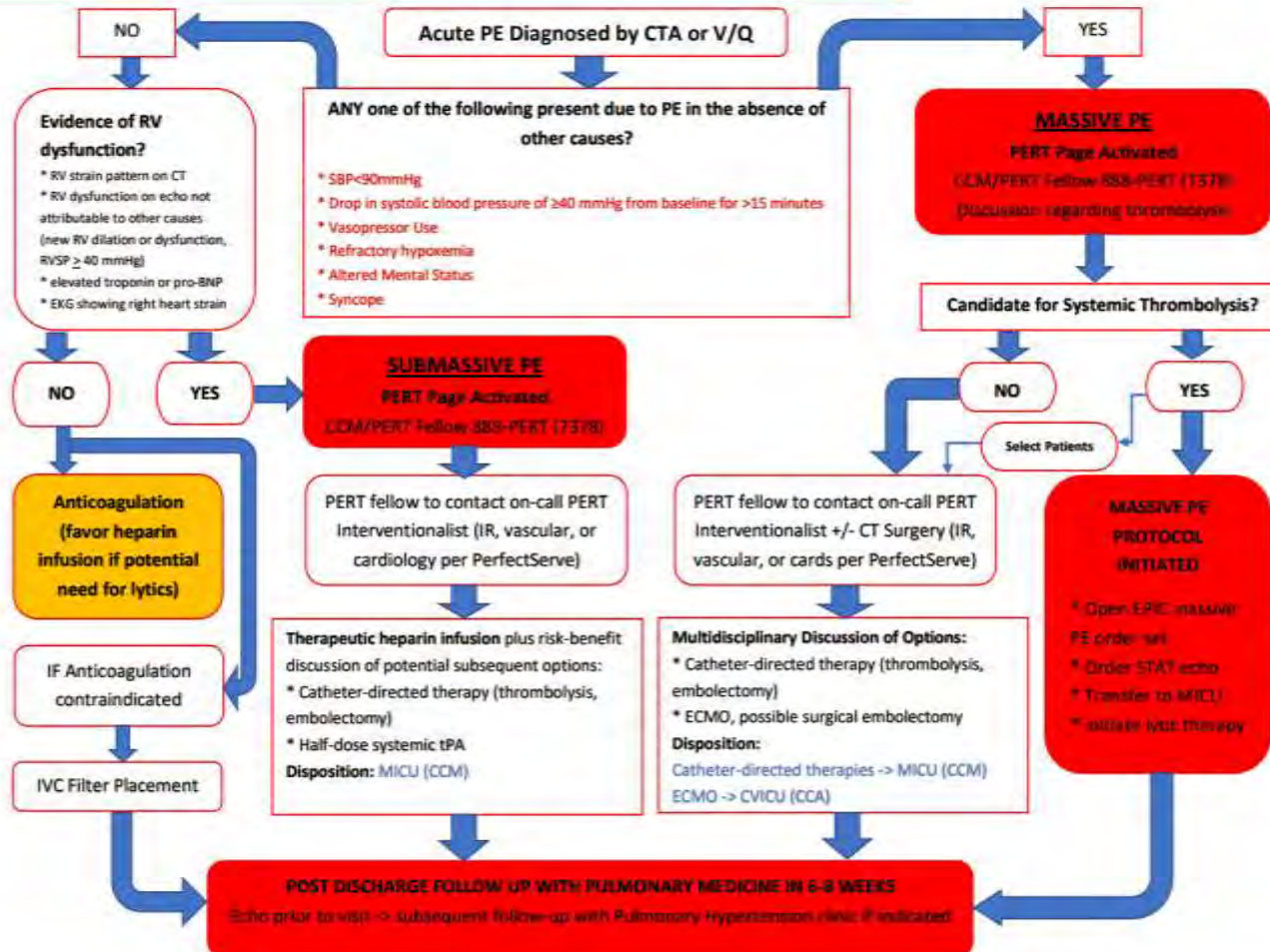


- Average of 402 patients a year admitted to UNMC with PE (subsegmental through massive)
- Vizient 30-day mortality: average of 8.9% per year vs. 5.56% in treated patients with submassive or massive PE



# PE Treatment Algorithm

PE Response Team (PERT) - Pager: 888-PERT



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# Case example #1:

16 yo F w/ no sig PMHx presented to an OSH w/ SOB x 1 wk. She was found to be hypoxic 70% on RA and quickly escalated to 35L HF. CT PE with RH strain. On exam, tachypneic to 25 on 35L HF with SPO2 of 90%. Trop I 704 and CHF peptide 619. O2 requirements increased to 60L HF.

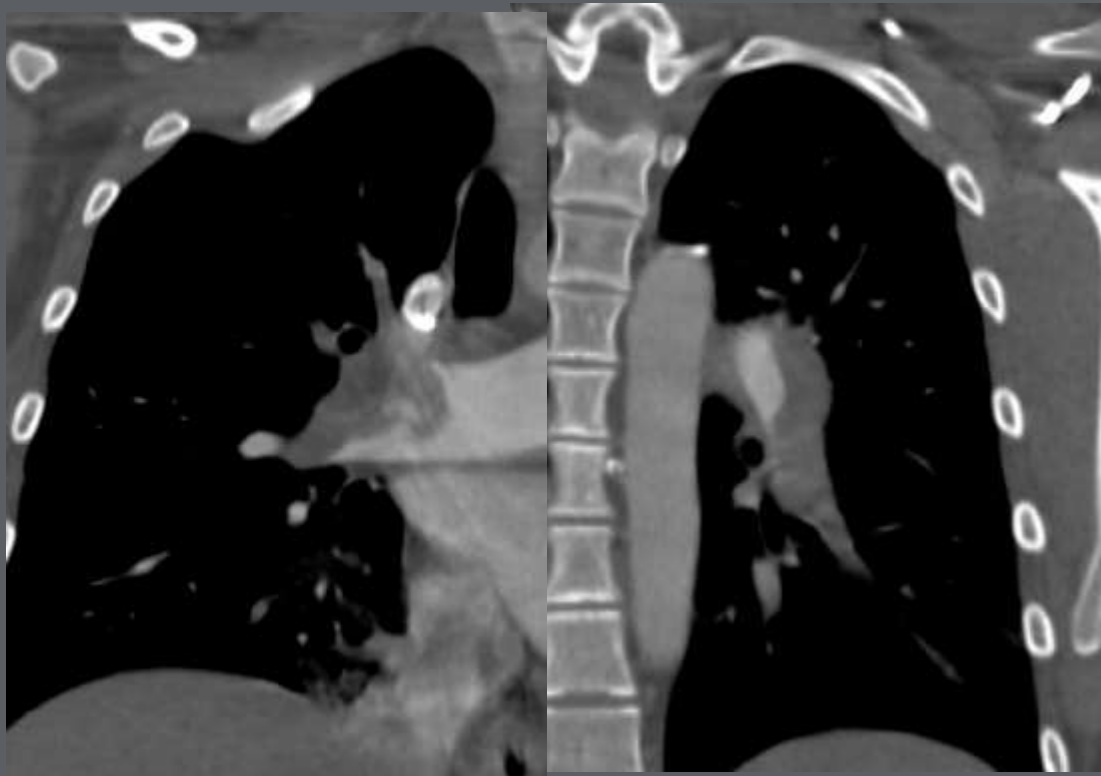
TTE with mod to severe RV systolic function.

PERT Activated on admission-> Agreement for advanced therapies with VV ecmo standby

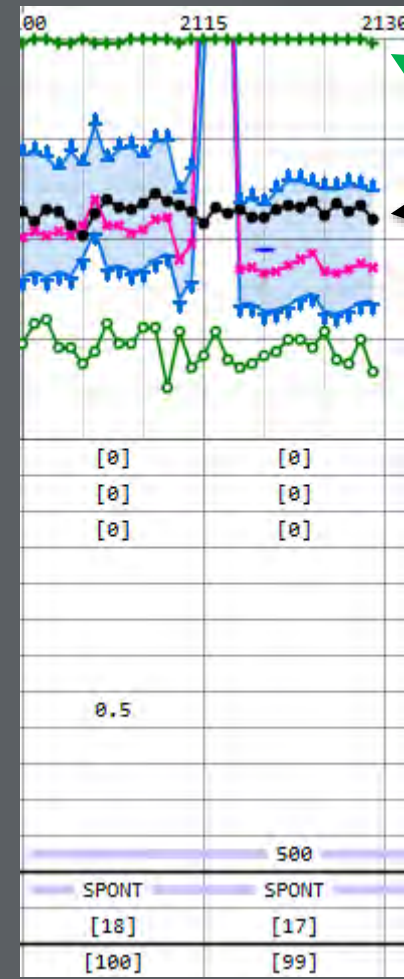
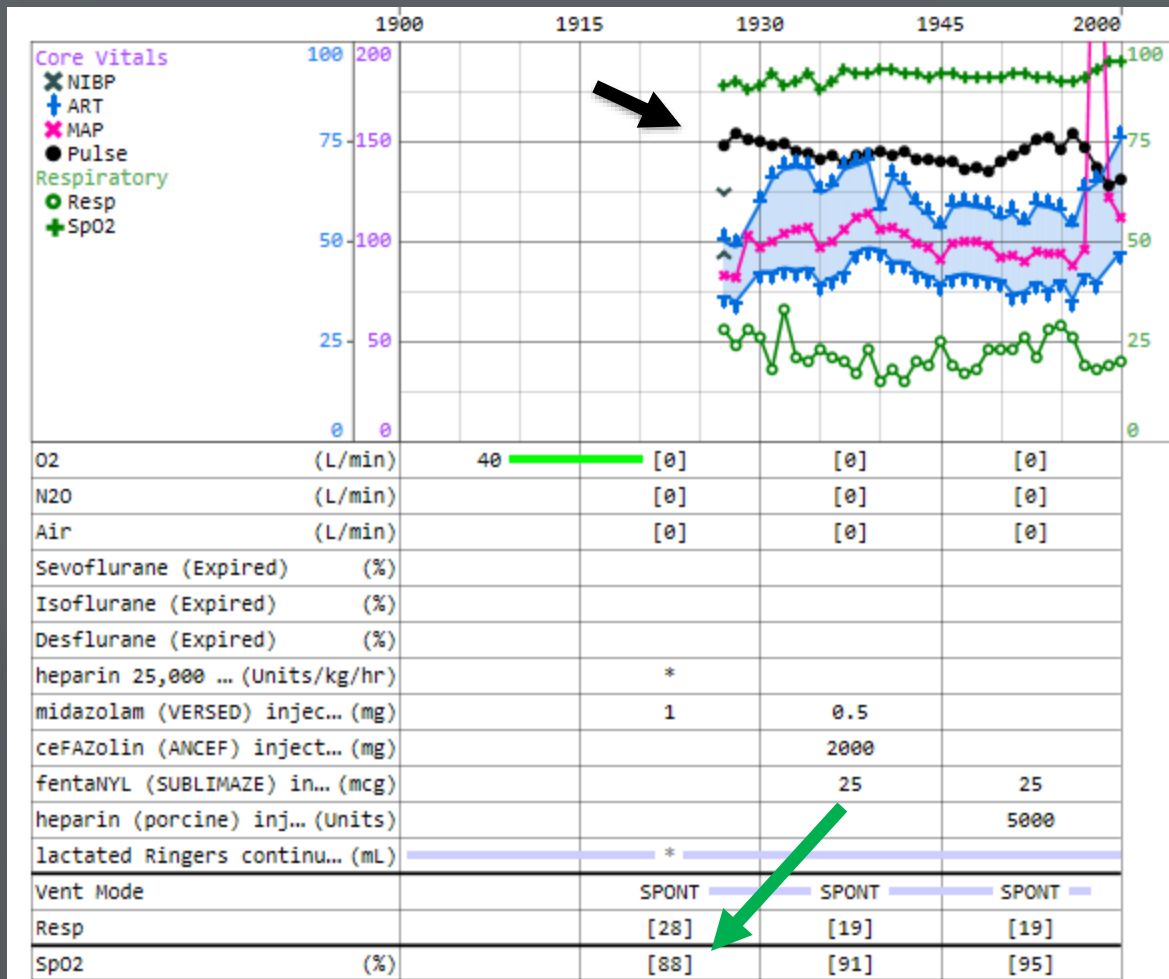




# Pre-op CT



# Intra-op Summary



## Totals:

- Duration 80 min
- Anesthesia: MAC + local
- EBL 150ml
- Contrast 86cc

### Post-Thrombectomy Pressures:

Right PA: 26/15 (19)mmHg

Left PA: 29/15 (20)mmHg

Main PA: 17/10 (16) mmHg

Post procedure day 1: Weaned from 45L HF to no supplemental oxygen

Discharged home on POD3

Extracted thrombus:



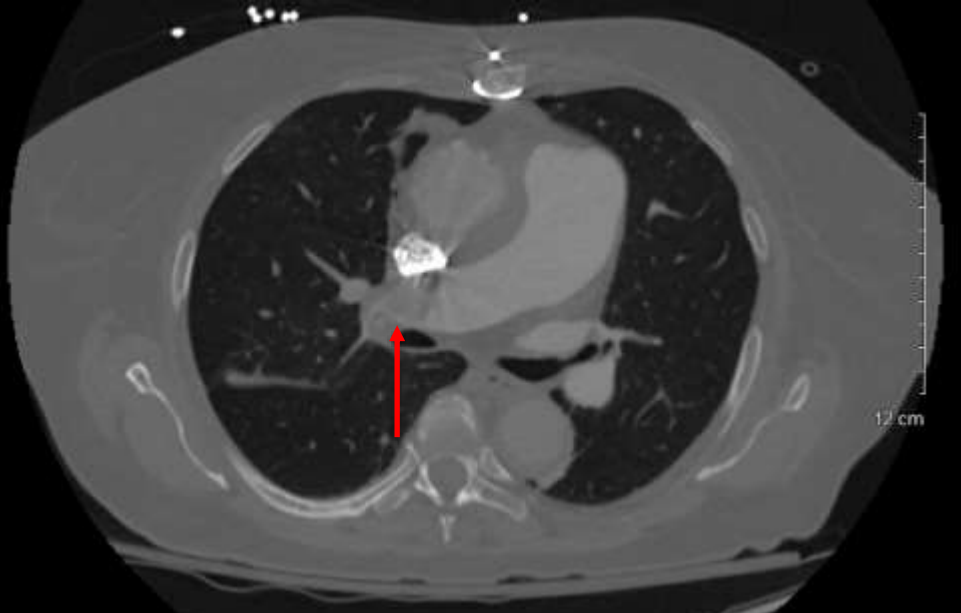
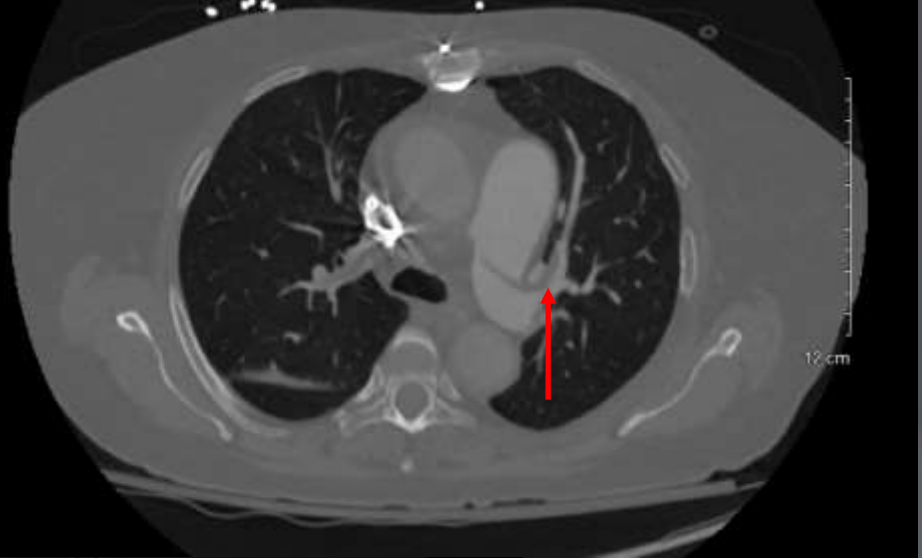
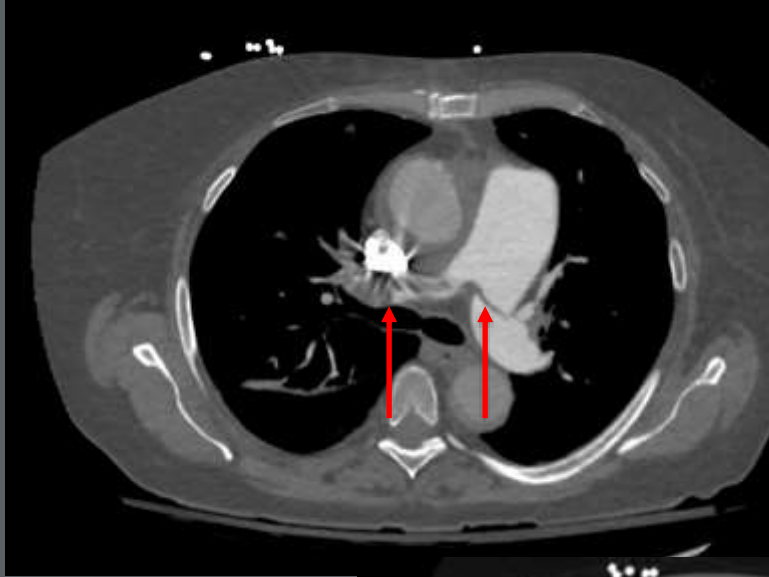
# Case example #2:

66 yo F w/ h/o Type A dissection s/p hemiarch w/ REIV avulsion c/b ex-lap and ligation of the right iliac veins 3 months PTA with recent admission for RP hematoma on coumadin, readmitted with SOB and hypoxic to 78% on RA w/ saddle PE on CT.

TTE: RV dilated with mildly reduced function. Estimated PA pressure 55-60mmHg, 4L nasal cannula



# Case example:



# Procedure:

## Pre-Thrombectomy PA pressures:

Main PA: 60/30mmHg, MAP 39mmHg

Left PA: 62/31mmHg, MAP 39mmHg

Right PA: 59/31mmHg, MAP 40mmHg

## Post-Thrombectomy PA pressures

Main PA: 39/22mmHg, MAP 27mmHg

Left PA: 36/21mmHg, MAP 25mmHg

Right PA: 38/23mmHg, MAP 27mmHg

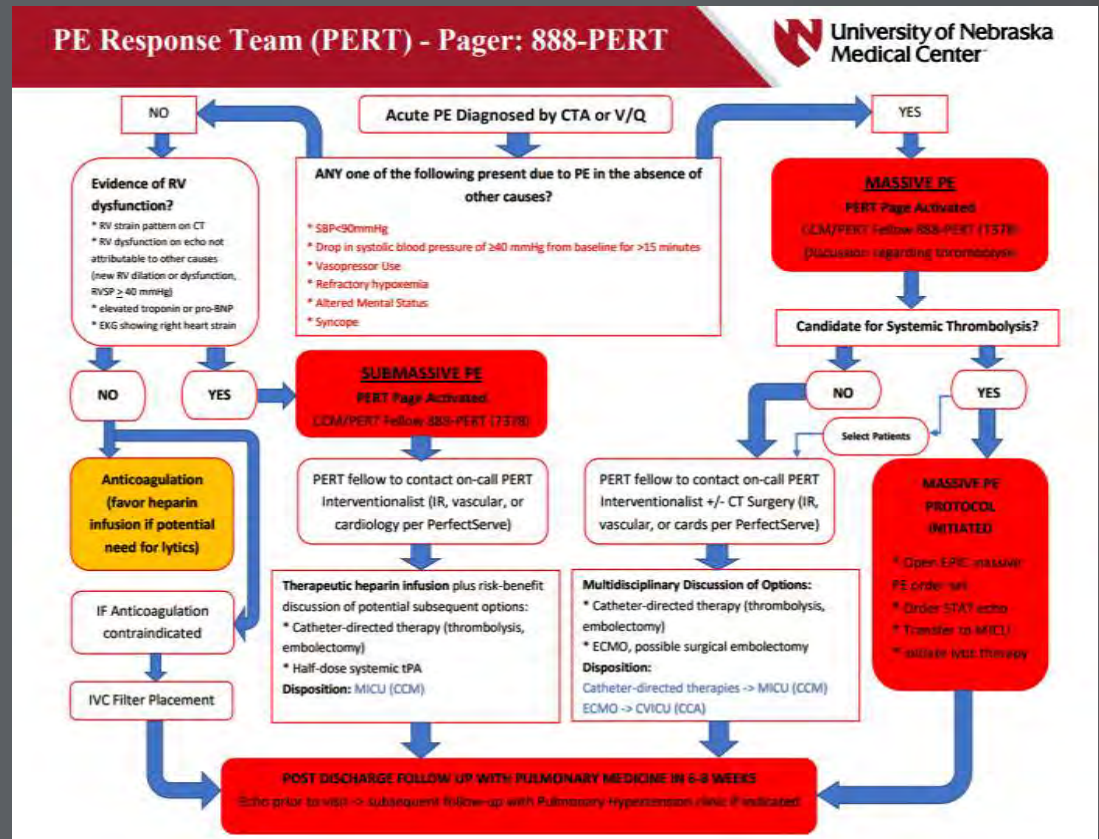


- 30% reduction mean PA pressure



# UNMC PE Response Team

- 1) Patient centered approach to pulmonary embolisms
- 2) Multidisciplinary team approach
- 3) With PERT -> Reduction in mortality, length of stay, and ICU length of stay



**Thank you**